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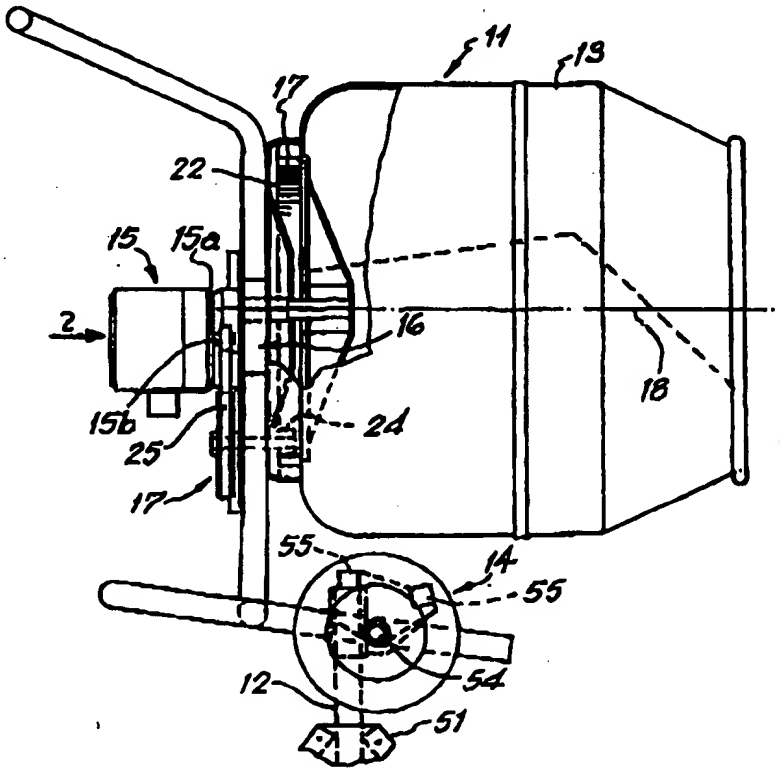
(54) Title: BARREL MIXER

(57) Abstract

There is disclosed a barrel mixer (11) comprising a support (12) for a rotary mixer barrel (13), including a tipping arrangement (14) for said barrel (13) limiting tipping between a mixing position in which the barrel (13) is angled so as to retain its contents and a tipping position in which the barrel (13) is angled so that its contents are poured out, a motor (15) and transmission (16) mounted on said support (12) for rotating the barrel including step-down gearing between the motor (15) and the barrel (13), the motor (15) and gearing (33) tipping with the barrel (13), the motor shaft (15b) being, at an intermediate position between mixing and tipping positions of the barrel (13), vertical, and the motor (15) being of a type having a mounting plate (31) surrounding the motor shaft (15b).



BARREL MIXER

This invention relates to barrel mixers such as are mainly used for mixing cement and in particular to such mixers designed for light or medium duty mixing and adapted for single-handed movement and operation.

Conventional such mixers are powered by electric motors or by internal combustion engines, usually small, petrol-driven motors driving the rotary mixing barrel through reduction gearing. Over the decades during which mixers of this kind have been commercially available, the design of the barrel support arrangements and the motor transmission arrangements have been refined with a view to reducing the weight but improving the robustness and efficiency, always with the intention of reducing the cost and increasing the value-for-money of the mixers, to the point where it is difficult to see what further savings can be made for any particular specification.

The present invention, however, makes possible substantial cost savings. Features of preferred arrangements facilitated by the invention give rise to further advantages.

The invention comprises in one aspect a barrel mixer comprising a support for a rotary mixer barrel, including a tipping arrangement for said barrel limiting tipping between a mixing position in which the barrel is angled so as to retain its contents and a tipping position in which the barrel is angled so that its contents are poured out, a motor and transmission mounted on said support for rotating the barrel including step-down gearing between the motor and the barrel, the motor and gearing tipping with the barrel, the motor shaft being, at an intermediate position between mixing and tipping positions of the barrel, vertical, and the motor being of a type having a mounting plate surrounding the motor shaft.

The motor may comprise an internal combustion engine, which may be of the type adapted to power rotary mowers, or an electric motor, which may be of the open frame type adapted to power washing machines. So that the same design may be used, simplifying manufacturing, for both electric motors and internal combustion engines, the mixing and tipping positions may be arranged to be within the limits for operation of a vertical axis lawn mower motor.

The orientation of an electric motor, of course, makes no difference to its operation, but if tipping is limited, no matter what engine is used, only one design of support need be made saving on design, manufacturing and inventory costs.

There is, of course, no fundamental difference between these types of motors and any other; it is simply a question of design to suit a given purpose. That having been said, the lawn mower motor and the washing machine motor were designed to perform particular tasks and to suit particular pieces of machinery. Conventional general purpose motors with conventional mounts have been the engineers choice for pretty well every other piece of equipment.

It is surprising, therefore, to find that by the invention the cost of barrel mixers can be significantly reduced, while retaining, even enhancing, all the desirable features of conventional barrel mixers, and this is the more surprising since both barrel mixers and motors of the kind with which the invention is concerned have coexisted for decades without it ever having been suggested that the motor could be or should be used in the mixer, far less any attempt having been made to exploit the combination commercially. It is all the more surprising when it is realised that motors of this type, by virtue of their widespread use in lawn mowers and washing machines, are commercially available at a significant discount over the general purpose motors.

In any event, these motors are found to lend themselves entirely appropriately to barrel mixers, each of which has its own advantages over and above the overall cost reduction due to the lower motor price.

In another aspect, the invention comprises a barrel mixer comprising a support for rotary mixer barrel, a motor mounted on said support and transmission for rotating the barrel, the transmission including a gear ring on the barrel with inwardly facing gear teeth, the motor and transmission being contained, viewed axially of the barrel, within the circumference of the barrel.

The motor may, again, be of the type having a mounting plate surrounding the motor shaft.

The motor may be mounted with its axis parallel to the axis of rotation of the barrel. The motor may then be mounted in a mounting plate and drive the barrel through gearing which is axially parallel the motor and the barrel. The barrel may have a large diameter (i.e. at or near outer radius of the barrel) drive ring with radially inwardly directed teeth meshing with a cog driven directly or indirectly by the motor. The cog may be driven by a belt drive from the motor shaft, or by an intermediate cog.

The motor, however, may be mounted with its axis at right angles to the direction of the axis of rotation of the barrel.

The motor may be mounted in a first mounting plate or frame of the support with its shaft projecting through said plate or frame, and the barrel mounted on a second mounting plate or frame by means of a right-angle gear (a gear whose output and input shafts are at right angles) connected directly or indirectly to the motor shaft. The right-angle gear may comprise a worm gear.

The motor shaft, as before, may be connected by a belt drive or by meshing cogs to the right-angle gear.

The support means may comprise a wheeled trolley, which may comprise a frame having wheels mounted on a frame base, a support for the barrel supporting the barrel on the same side of the frame as the frame base and supporting the motor and transmission on the opposite side of the frame, and handle means projecting from the frame at the opposite end thereof to the frame base and on the same side of the frame as the motor and transmission.

The frame base may comprise a rest extending on the motor and transmission side of the frame on which (and the wheels), the mixer rests with the barrel axis inclined upwardly for mixing and, beyond the wheels, a foot on to which the mixer can be tipped for pouring.

The support may additionally comprise a stand with a pintle bearing receiving the trolley and having a tipping arrangement allowing the support to be tipped on the pintle bearing between mixing and pouring positions.

The barrel may be demountable from the support, and the support break down to fit inside the barrel for stowage and transportation.

Embodiments mixers according to the invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a side elevation of a first embodiment;

Figure 2 is a rear view on arrow 2 of Figure 1;

Figure 3 is a view like Figure 1 tipped to a mixing position;

Figure 4 is a view like Figure 1 tipped to a pouring position;

Figure 5 is a side elevation of a second embodiment; and

Figure 6 is a view on arrow 5 of Figure 4.

The drawings illustrate barrel mixers 11 comprising a support 12 for a rotary mixer barrel 13. The support 12 includes a tipping arrangement 14 for the barrel 13. The support 12 also supports a motor 15 and transmission 16 for rotating the barrel 12, the transmission 16 including step-down gearing between the motor 15 and the barrel 12, the motor 15 and gearing 17 tipping with the barrel 13.

The motor 15 is of the type having a mounting plate 15a surrounding the motor shaft 15b. The motor 15 can be an internal combustion engine such as a petrol engine of the type used to power rotary lawn mowers, or an open frame electric motor, of the type, for example, used to power washing machines. In either case, these motors are of the kind referred to as "vertical shaft motors", because in their intended situations, i.e. in rotary lawn mowers and in washing machines, their axes are vertical. In fact, the essential distinction between these vertical axis motors and commonplace motors is that the motor mounting plate surrounds the motor shaft.

Figures 1 to 4 illustrate a mixer in which the motor 15 is mounted with the axis of the shaft 15b parallel to the axis 18 of rotation of the barrel 13. The motor 15 is mounted on the mounting plate 15a and drives the barrel 13 through the gearing 17 which is axially parallel the motor 15 and the barrel 13. The barrel 13 has a large diameter drive ring 22 (which may be made in four sections, for example, bolted on to the bottom of the barrel) with radially inwardly directed teeth 23 meshing with a cog 24

driven directly or indirectly by the motor 15. The cog 24 is driven by a belt drive 25 from th motor shaft 15b, but could equally well be driven by an intermediate cog from the motor shaft 15b.

Figures 5 and 6 illustrate a mixer 11 - which the motor 15 is mounted with its axis at right angles to the axis of rotation of the barrel 13. The motor 15 is mounted on a first mounting plate or frame 31 of the support 12. The barrel 13 is mounted on a second mounting plate or frame 32 and driven by means of a right-angle gear 33 connected to the motor shaft 15b. The right-angle gear 33 illustrated comprises a worm gear, but could equally comprise for example a bevel gear.

While the motor shaft 15 could, given appropriate ratio arrangements, be connected directly to the worm gear 33, in the illustrated arrangement, the motor shaft 15b is connected indirectly to the worm gear 33; the illustrated arrangement is a belt drive 34, but could equally well be a meshing cog arrangement.

In each embodiment the support 12 comprises a wheeled trolley.

In the case of the embodiment of Figures 5 and 6, the wheeled trolley comprises a frame 41 having wheels 42 mounted on a frame base 43, a support 44 for the barrel 13 supporting the barrel on the same side of the frame 41 as the base 43 and supporting the motor 15 and transmission 16 on the opposite side of the frame 41, and handle means 45 (comprising two handles 36) projecting from the frame 41 at the opposite end thereof to the frame base 43 and on the same side of the frame 41 as the motor 15 and transmission 16.

The frame base 43 comprises a rest 47 extending on the motor and transmission side of the frame 41 on which (and on the wheels 42) the mixer 11 rests

with the barrel 13 axis inclined upwardly for mixing, and, beyond the wheels 42, a fulcrum 48 on which the mixer 11 can be tipped for pouring.

Figures 1 to 4 illustrate a mixer in which the support 12 additionally comprises a stand 51 with a pintle bearing 52 receiving the trolley, and having a tipping arrangement 53 allowing the support 12 to be tipped on the pintle bearing 52 between mixing and pouring positions (Figures 3 and 4 respectively)

The tipping arrangement 52 comprises a fulcrum 54 on the trolley carried in a channel section on the pintle bearing 52 and having tipping limiter means 55 on the trolley abutting the pintle bearing 52 at first and second positions defining mixing and pouring positions.

The trolley has wheels 42 like the embodiment of Figures 1 to 4 by which it can be wheeled when off the stand.

The barrel in both embodiments is demountable from the support and the support breaks down to fit inside the barrel for stowage or transportation.

CLAIMS

1. A barrel mixer comprising a support for a rotary mixer barrel, including a tipping arrangement for said barrel limiting tipping between a mixing position in which the barrel is angled so as to retain its contents and a tipping position in which the barrel is angled so that its contents are poured out, a motor and transmission mounted on said support for rotating the barrel including step-down gearing between the motor and the barrel, the motor and gearing tipping with the barrel, the motor shaft being, at an intermediate position between mixing and tipping positions of the barrel, vertical, and the motor being of a type having a mounting plate surrounding the motor shaft.

2. A mixer according to claim 1, in which the motor comprises an internal combustion engine.

3. A mixer according to claim 2, in which the engine is of the type used to power rotary lawn mowers.

4. A mixer according to claim 1, in which the support and limited tipping is adapted for mounting an engine of the type used to power rotary lawn mowers, but the motor is an electric motor.

5. A mixer according to claim 4, in which the electric motor is of the type adapted to power washing machines.

6. A barrel mixer comprising a support for rotary mixer barrel, a motor mounted on said support and transmission for rotating the barrel, the transmission including a gear ring on the barrel with inwardly facing gear teeth, the motor and transmission being contained, viewed axially of the barrel, within the circumference of the barrel.

7. A mixer according to claim 7, in which the motor is of the type having a mounting plate surrounding the motor shaft.

8. A mixer according to claim 6 or claim 7, in which the motor is mounted on the support with its axis substantially parallel to or aligned with the axis of the barrel.

9. A mixer according to claim 8, in which said inwardly facing gear teeth mesh with a pinion driven from the motor shaft by a flexible drive arrangement.

10. A mixer according to claim 9, in which said flexible drive arrangement comprises a belt, timing belt, chain or like member trained over pulley, cog or like wheel means.

11. A mixer according to any one of claims 7 to 10, in which the support comprises a mounting plate having bearings for a spindle on which the barrel rotates, the motor and a transmission member.

12. A mixer according to any one of claims 7 to 11, in which said support includes a tipping arrangement for said barrel limiting tipping between a mixing position in which the barrel is angled so as to retain its contents and a tipping position in which the barrel is angled so that its contents are poured out.

13. A mixer according to any one of claims 1 to 12, in which said support comprises a wheeled trolley.

14. A mixer according to claim 13, in which the wheeled trolley comprises a frame having wheels mounted on a frame base, a support for the barrel supporting the barrel on the same side of the frame as the frame base, and supporting the motor and transmission on the opposite side of the frame, and handle means projecting from the

frame at the opposite end thereof to the frame base and on the same side of the frame as the motor and transmission.

15. A mixer according to claim 14, in which the frame comprises a rest extending on the motor and transmission side of the frame on which (and the wheels) the mixer rests with the barrel axis inclined upwardly for mixing and, beyond the wheels, a foot on to which the mixer can be tipped for pouring.

16. A mixer according to any one of claims 13 to 15, the support additionally comprising a stand with a pintle receiving the trolley, and having a tipping arrangement providing a horizontal bearing receiving a fulcrum of the trolley and tipping limiting stops against which parts of the support abut in the mixing and tipping position.

17. A mixer according to any one of claims 1 to 16, in which the barrel is demountable from the support and the support breaks down to fit inside the barrel for storage or transportation.

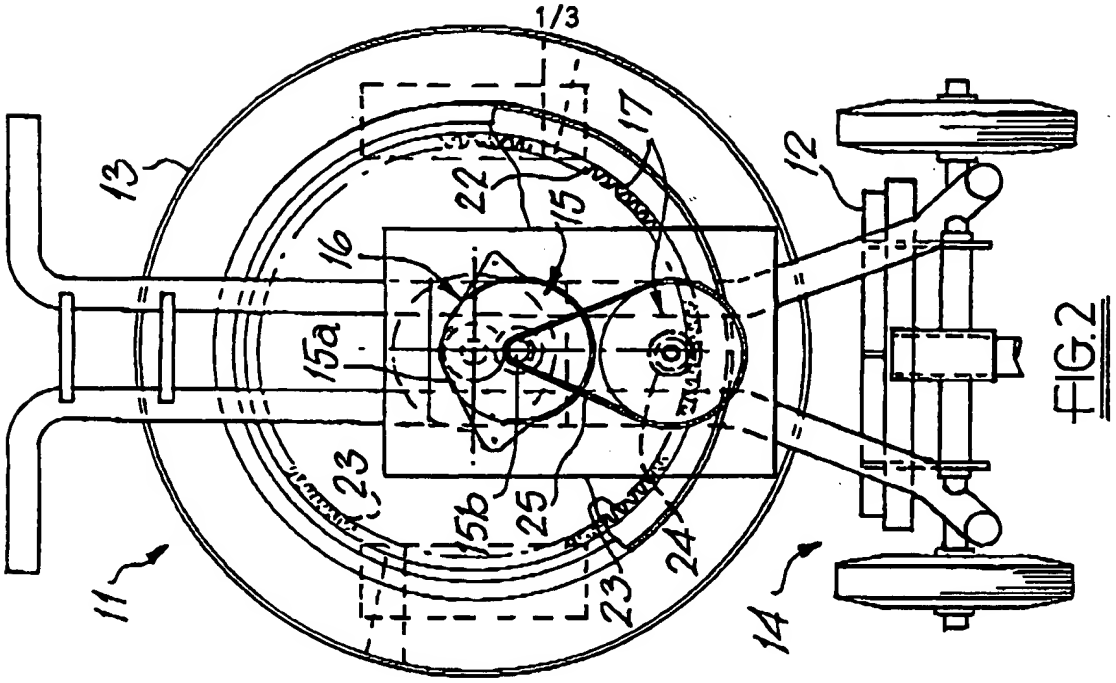


FIG.2

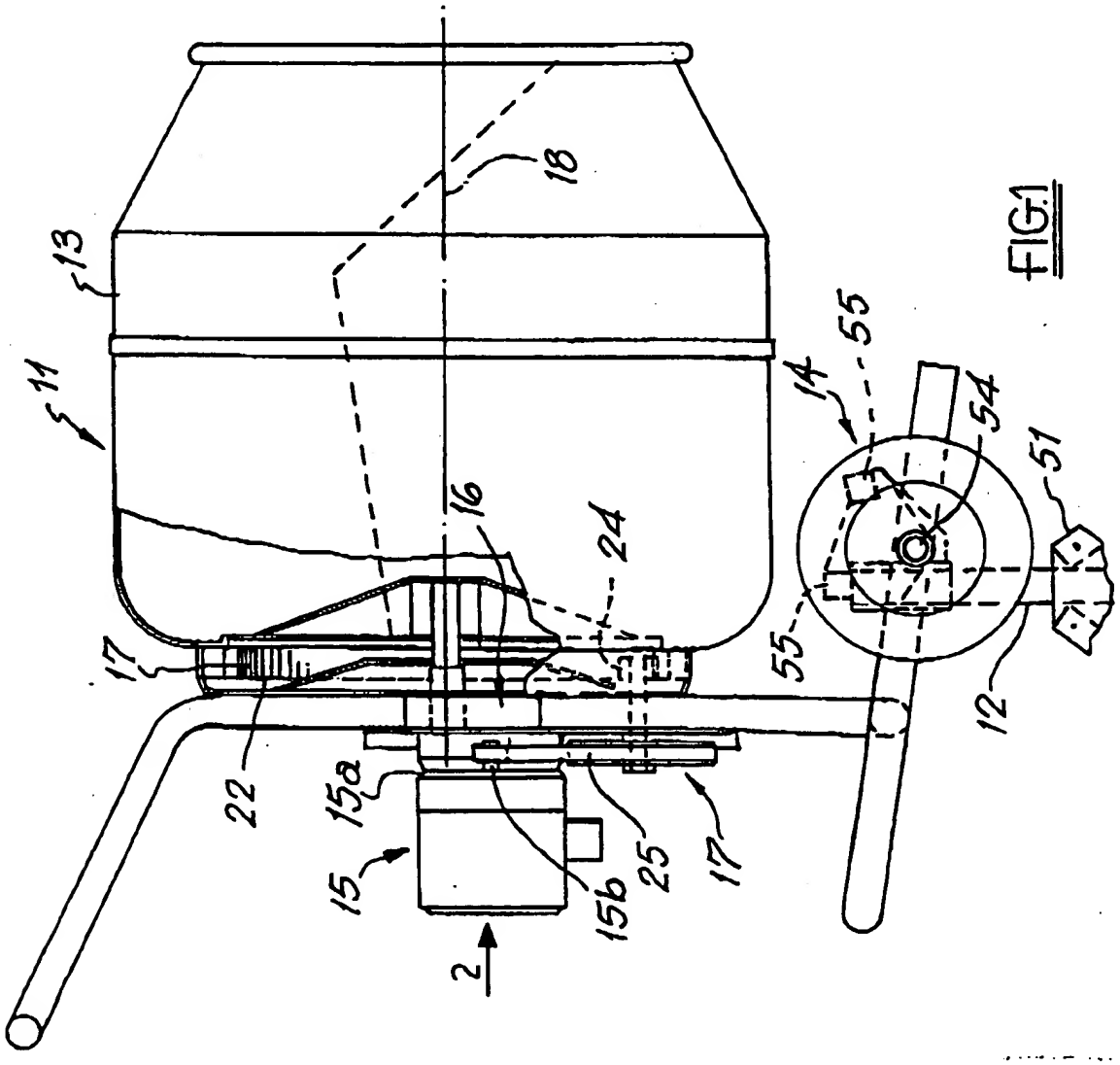


FIG.1

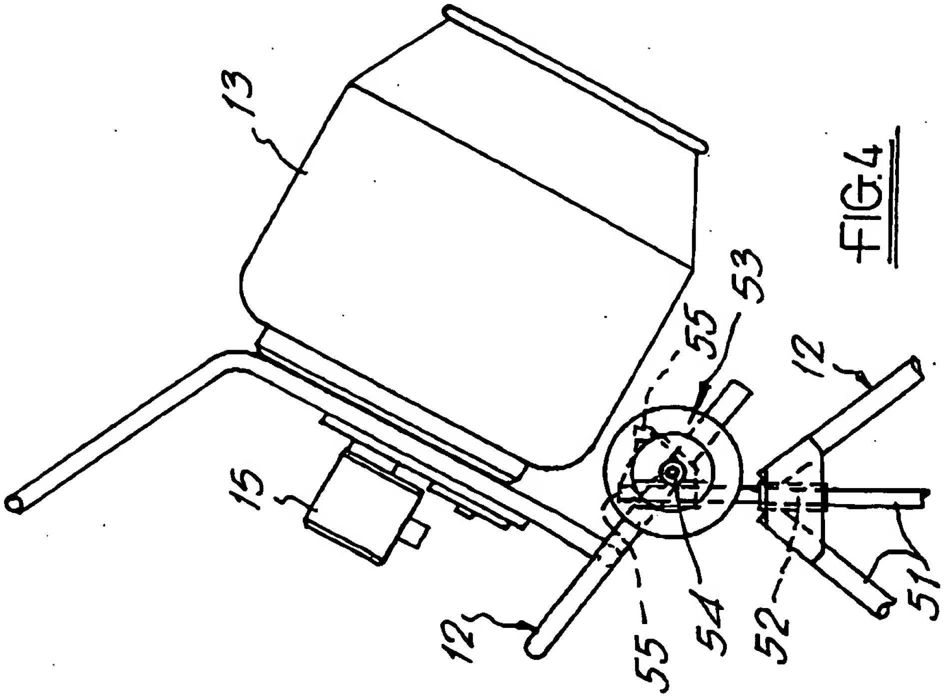


FIG.4

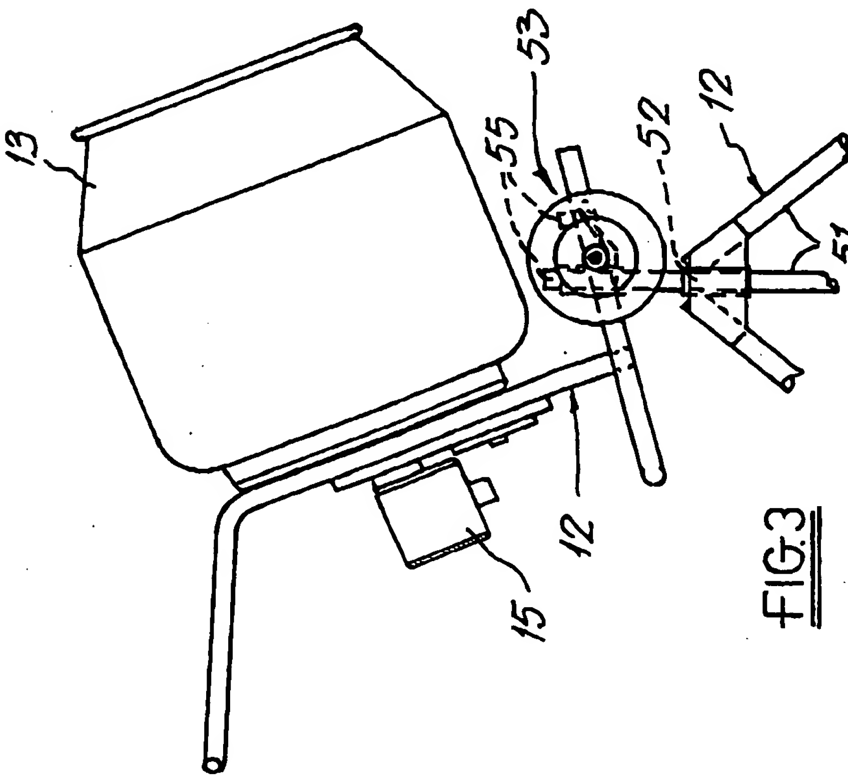


FIG.3

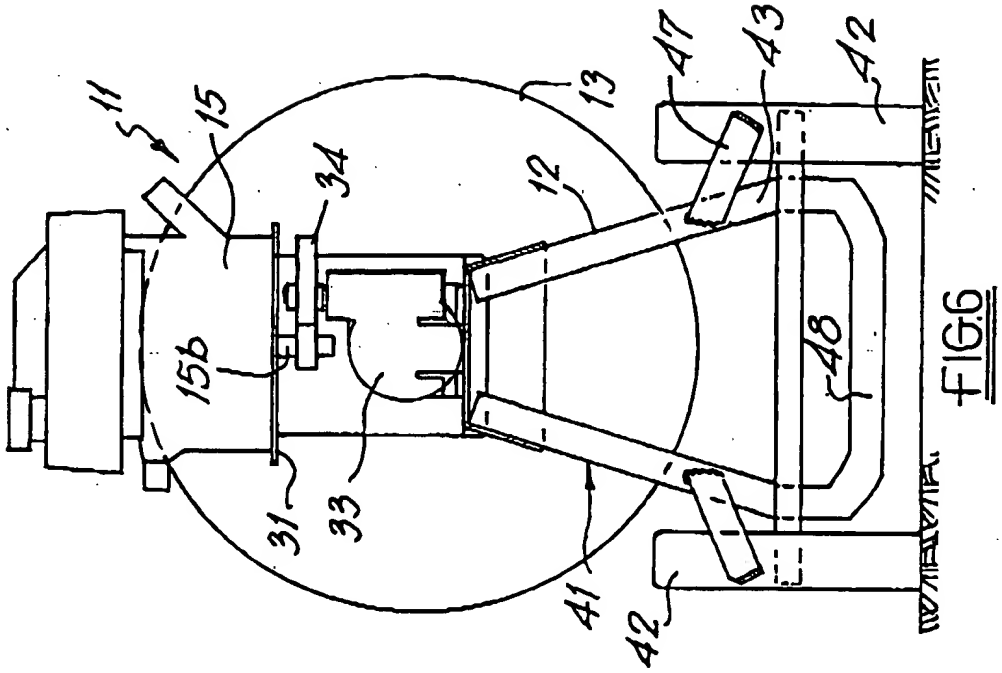


FIG.6

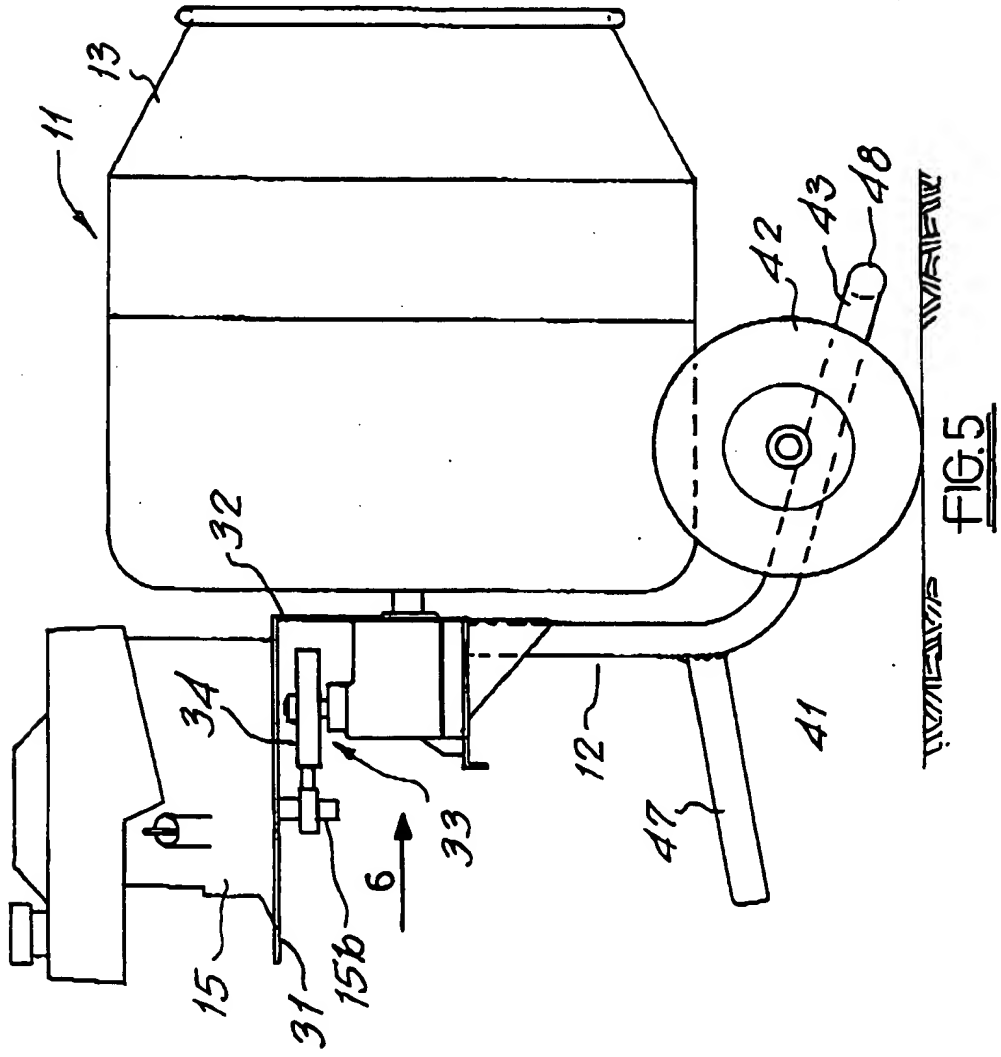


FIG.5

INTERNATIONAL SEARCH REPORT

/GB 97/02840

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B28C5/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B28C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 879 020 A (RAY SAM FRANCIS) 22 April 1975 see abstract; claims; figures see column 2, line 14 - column 3, line 16 see column 4, line 22 - column 4, line 68 ---	1-17
X	GB 2 214 100 A (SANDERS PAUL ANTHONY) 31 August 1989 see abstract; claims; figures see page 1, line 16 - page 2, line 5 see page 3, line 3 - page 4, line 17 ---	1,4-8, 11-17
X	US 2 573 296 A (PERRY ARANT) 30 October 1951 see column 2, line 47 - column 2, line 51 see claims; figures --- -/--	1,6-12

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
3 February 1998	13/02/1998

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

P[illegible]GB 97/02840

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category '	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 294 548 A (WATSON ARTHUR) 13 October 1981 see abstract; claims; figures	1,6-12
X	SU 1 743 886 A (ORENBOJM BORIS D :SALTAN SERGEJ S (SU)) 29 June 1992 see abstract; figure	1,6-8
A	US 4 223 997 A (VIOLET JON A ET AL) 23 September 1980 see abstract; claim 1; figures	1,8,12
A	EP 0 450 214 A (DOUBLE M IND PLC) 9 October 1991 see abstract; claims; figure 1	1,17

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

...formation on patent family members

P... GB 97/02840

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US 4294548 A	13-10-81	NONE	
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